PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P25536PC00	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/ZA 03/00183	International filing date *(day/month/year)* 08.12.2003	Priority date *(day/month/year)* 13.01.2003
International Patent Classification (IPC) or both national classification and IPC F41A27/08		
Applicant DENEL (PTY) LTD et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22.06.2004	24.03.2005
Name and mailing address of the international preliminary examining authority: European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840	Authorized Officer Jankowska, M Telephone No. +49 30 25901-506

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/ZA 03/00183

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-7 as originally filed

Claims, Numbers

1-7 received on 12.01.2005 with letter of 11.01.2005

Drawings, Sheets

1/8-8/8 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

   see separate sheet

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2,3,4
	No:	Claims	1,5,6,7
Inventive step (IS)	Yes:	Claims	2,3
	No:	Claims	1,4,5,6,7
Industrial applicability (IA)	Yes:	Claims	1-7
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following document:

   D1: GB-A-1 493 632 (SECR DEFENCE) 30 November 1977 (1977-11-30)
   D2: US-A-4 699 528 (GOTMAN ALEXANDER) 13 October 1987 (1987-10-13)

2. INDEPENDANT CLAIM 1

   The document D1 discloses (the references in parentheses applying to this document):

   A trunnion assembly (see description and figure) for a gun comprising:
   - a trunnion shaft (4);
   - a housing (2,3) defining a bore for rotatably and concentrically receiving the trunnion shaft (4), and
   - a bearing assembly (11) located inside the housing (2,3) and surrounding the trunnion shaft (4),
   wherein:
   - the longitudinal axis (9) of the shaft (4) is movable out of alignment (see the figure) with the longitudinal axis of the bore when the shaft (4) is biased in a direction transverse the said longitudinal axes (9),
   - and the bearing assembly (11) allows rotation of the shaft (4) in the bore whilst also allowing the movement of the longitudinal axis (9) of the shaft (4) out of alignment with the longitudinal axis of the bore (see the figure),
   - and the bearing assembly (11) further includes a re-aligning means (see page 2, lines 21-26) for re-aligning the longitudinal axes of the shaft and the bore, after the movement out of alignment.

   The statement "shaft is moveable out of alignment ... **by the impetus caused by the rearward movement of the gun when the gun is fired**" is a functional statement which does not define the apparatus (trunnion assembly) in terms of its technical features. The intended limitations are therefore not readable from the claim.

The subject-matter of claim 1 is therefore not new in the sense of Article 33(2) PCT.

3. DEPENDANT CLAIM 2

The subject-matter of claim 2 differs from the assembly known from D1 in that:
- the realigning means is in the form of a ball bearing assembly also located inside the bore of the housing and surrounding the trunnion shaft,
- the ball baring assembly includes a central ball bearing and two resiliently compressible O-rings disposed on opposite sides of the ball bearing,
- and a cam ring is disposed between each O-ring and the ball bearing, each cam ring having a cam surface for abutting an outer surface of the ball bearing, the arrangement being such that when the trunnion shaft moves out of concentric alignment with the bore, one of the cam rings moves towards its O-ring to compress the same, the compressed O-ring expands after the biasing force has been neutralized to move the shaft back into concentric alignment with the bore.

The subject-matter of claim 2 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to provide a re-aligning means for the shaft.

The solution to this problem proposed in claim 2 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:
- the skilled person would consider the use of the re-aligning means in the form of a ball bearing including a central ball bearing and two resiliently compressible O-rings disposed on opposite sides of the ball bearing knowing the teaching of D2,
- neither D1 nor D2 discloses a cam ring disposed between each O-ring and the ball bearing as defined in Claim 2. Consequently the skilled person would not derive the subject-matter of claim 2 combining D1 and D2.

4. DEPENDANT CLAIMS 3-5

Claim 3 is dependent on claim 2 and as such also meets the requirements of the PCT with respect to novelty and inventive step.

The subject-matter of claim 4 differs from D1 in that the bearing assembly is a toroidal-type bearing assembly. Such bearings are however widely known in the field of trunnions used for mounting guns. The choice of a known bearing type to be included in the assembly known from D1 does not justify an inventive step. The subject-matter of claim 4 lacks an inventive step.

Furthermore D1 discloses a gun provided with a trunnion assembly as disclosed in claim 1. The subject-matter of claim 5 lacks novelty.

Claims 4 and 5 when dependant on claim 2 would meet the requirements of the PCT with respect to novelty and inventive step.

5. INDEPENDANT CLAIMS 6 and 7

Claims 6 and 7 contain references to the description and the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

The only technical features which are allowably defined in claims 6 and 7 are a trunnion assembly (claim 6) and a gun with such a trunnion assembly (claim 7). All these features (gun, trunnion assembly) are disclosed by D1. Consequently the subject-matter of claims 6 and 7 lacks novelty (Art. 33(2) PCT).

ADDITIONAL OBSERVATIONS

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

CLAIMS

1. A trunnion assembly comprising:

   - a trunnion shaft; and
   - a housing defining a bore for rotatably and concentrically receiving the trunnion shaft,

   the trunnion assembly according to the present invention being characterised in that the longitudinal axis of the shaft is movable out of alignment with the longitudinal axis of the bore when the shaft is biased in a direction transverse the said longitudinal axes.

2. A trunnion assembly according to claim 1 which includes a bearing assembly located inside the housing and surrounding the trunnion shaft and which allows rotation of the shaft in the bore whilst also allowing the said movement of the longitudinal axis of the shaft out of alignment with the longitudinal axis of the bore.

3. A trunnion assembly according to claim 2 wherein the bearing assembly includes a toroidal-type roller bearing assembly.

4. A trunnion assembly according to claim 3 wherein the bearing assembly further includes a re-aligning means for re-aligning the longitudinal axes of the shaft and the bore, after the said movement out of alignment.

5. A trunnion assembly according to claim 4 wherein the re-alignment means is in the form of a ball bearing assembly also located inside the bore of the housing and surrounding the trunnion shaft.

6. A trunnion assembly according to claim 5 wherein the ball-bearing assembly includes a central ball bearing and two resiliently compressible O-rings disposed on opposite sides of the ball bearing.

7. A trunnion assembly according to claim 6 wherein the O-rings are each located in an O-ring retainer.

8. A trunnion assembly according to claim 6 or claim 7 wherein a cam ring is disposed between each O-ring and the ball bearing, each cam ring having a cam surface for abutting an outer surface of the ball-bearing, the arrangement being such that when the trunnion shaft moves out of concentric alignment with the bore, one of the cam rings moves towards its O-ring to compress the same, the arrangement being further such that the compressed O-ring expands after the biasing force has been neutralised to move the shaft back into concentric alignment with the bore.

9. A gun provided with a trunnion assembly according to claims 1 to 8

10. A trunnion assembly substantially as herein described and as illustrated in the accompanying drawings.

11. A gun provided with a trunnion assembly substantially as herein described and with reference to the accompanying drawings.